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IS 13404 (2012): Power trowel - General requirements [MED 18: Construction Plant and Machinery]

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पावर ट्रावैल — सामान्य अपेक्षाएँ

(पहला पुनरीक्षण)

Indian Standard

POWER TROWEL — GENERAL REQUIREMENTS

(First Revision)

ICS 91.220

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2012 **Price Group 3**

Construction Plant and Machinery Sectional Committee, MED 18

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1992. Power trowel is used for finishing the top surface of green concrete. It is more economical and time saving particularly for finishing the top surface of large concrete floors or panels in the modern buildings. Besides, speed and economy, the use of power trowel ensures better quality control. The power trowel applies enough pressure to produce dense and uniform surface, free of spots, ripples and trowel marks. The finished surface is so fine that mortar coating or cover by other materials may be reduced considerably or even dispensed with. The experience gained in implementation of the standard and revision/superseding of reference standards have necessitated this revision.

The composition of Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the results of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard
POWER TROWEL — GENERAL REQUIREMENTS
(First Revision)

1 SCOPE

This standard lays down the requirements regarding size, material, design, construction, safety and performance of power trowel.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
210 : 2009	Grey iron castings — Specification (*fifth revision*)
318 : 1981	Specification for leaded tin bronze ingots and casting (*second revision*)
325 : 1996	Three phase induction motors (*fifth revision*)
617 : 1994	Aluminium and aluminium alloy ingots and castings for general engineering purposes (*third revision*)
1079 : 1994	Hot-rolled carbon steel sheet and strip — Specification (*fifth revision*)
1148 : 1982	Hot-rolled rivet bar (up to 40 mm dia) for structural purposes (*third revision*)
1239	Mild steel tubes, tubulars and other wrought steel fittings:
(Part 1) : 2004	Mild steel tubes (*sixth revision*)
(Part 2) : 1992	Mild steel tubulars and other wrought steel pipe fittings (*fourth revision*)
2004 : 1991	Carbon steel forgings for general engineering purposes (*third revision*)
2062 : 2006	Hot-rolled low, medium and high tensile structural steel (*sixth revision*)
2403 : 1991	Short pitch transmission precision roller chains and chain wheels (*second revision*)
2494 (Part 1) : 1994	V-belts — Endless V-belts for industrial purposes: Part 1 General purpose — Specification (*second revision*)
2707 : 1996	Carbon steel castings for surface hardening — Specification (*fourth revision*)
2932 : 1997	Enamel, synthetic, exterior: (a) Undercoating, (b) Finishing — Specification (*third revision*)
4454 (Part 1) : 2001	Steel wires for mechanical springs: Part 1 Patented and cold drawn steel wires — Unalloyed (*third revision*)

3 SIZES

Power trowel shall be of the following sizes:

a) 850 mm diameter blade sweep;
b) 1 000 mm diameter blade sweep; and
c) 1 150 mm diameter blade sweep.

4 SPEED

Nominal speed of rotation may be between 60 and 120 rev/min within tolerance of ±10 percent on declared operating speed.

5 OPERATING WEIGHT

Basically, power trowel is a floating machine for concrete finishing. For better performance of the machine, the operating weight shall be as light as possible. The maximum operating weight of power trowel shall be as follows:

Size of Power Trowel mm	*Maximum Operating Weight* kg
850	80
1 000	85
1 150	105

6 MATERIALS

Materials used for the construction of the power trowel shall comply with the requirements given in **6.1** to **6.18**.

6.1 Steel sections, bars and plates shall conform to IS 2062.

6.2 Carbon steel sheets shall conform to IS 1079.

6.3 Steel castings shall be of suitable grade conforming to IS 2707.

6.4 Carbon steel forged and stamped components shall be of suitable class conforming to IS 2004.

6.5 Grey iron castings shall be of suitable grade conforming to IS 210.

6.6 Rivet bars shall conform to IS 1148.

6.7 Springs shall be manufactured from suitable grade of wire conforming to IS 4454 (Part 1).

6.8 Steel tubes and fittings shall conform to IS 1239 (Part 1) and IS 1239 (Part 2) respectively.

6.9 V-Belts for belt drives shall conform to IS 2494 (Part 1).

6.10 All chains (steel bushed) shall conform to IS 2403.

6.11 All worm and shafts shall conform to relevant Indian Standards.

6.12 The blades shall be made from spring steel and shall have hardness between 45 and 48 HRC. Rough blade shall be made from high tensile structural steel conforming to IS 2062.

6.13 The electric motor shall be totally enclosed fan cooled type and shall conform to IS 325.

6.14 All gears shall conform to relevant Indian Standards.

6.15 The worm gear box housing shall be made of strong aluminium alloy castings conforming to IS 617 and worm wheel shall be made of leaded tin bronze casting conforming to IS 318.

6.16 The steering handle shall be made from steel tube conforming to IS 1239 (Part 1).

6.17 The tubular guard frame of the power trowel shall be manufactured from suitable ERW pipes conforming to 1S 1239 (Part 1).

6.18 Bearings suitable for smooth operation and power transmission shall be provided. The bearings and the shaft assembly shall be such as to enable the removal of shaft for repairs and maintenance. The quality of bearing shall be in accordance with the relevant Indian Standard.

7 CONSTRUCTION

7.1 Unit

A typical sketch of the unit is given in Fig. 1. It shall consist of the following:

a) Three or four tilting arms fixed in a spider unit shall be placed in a horizontal plane;
b) Gear box;
c) Prime mover;
d) Steering handle;
e) Pitch control mechanism and control knob;
f) Set of blades-levelling, finishing or combination (optional);
g) A sensitive clutch (Deadman type) (in case of petrol engine drive only);
h) A hand lever floor clutch (in case of I.C. engine drive only); and
j) 'ON' and 'OFF' push button starter/switch (in case of electric motor drive only).

7.2 Prime Mover

The prime mover may be a petrol engine or any electrical motor conforming to the relevant Indian Standard for industrial rating.

7.3 The tilting arms shall be capable of being fitted with two or three types of blades:

a) Levelling blades;
b) Finishing blades; and
c) Combination blades (optional).

7.4 Thickness of the blades shall not be less than 1.5 mm. Width of levelling, finishing and combination blades shall not be less than 150, 200 and 250 mm respectively. The blades shall operate inside a tubular guard frame in order to avoid the blades from hitting any object as well as to prevent any type of accident.

7.5 The drive from the prime mover to the worm gear box shall be through a V-belt.

7.6 The gear box shall have the provision for lubrication, oil level indicator, filling and drain plugs. It shall be capable of power transmission for continuous operation without over heating.

7.7 The steering handle shall be provided with suitable bearing to obtain smooth operation.

7.8 A suitable arrangement shall be provided to adjust the height of the steering handle to suit the height of the operator.

8 PERFORMANCE

8.1 The trowel shall not suffer any damage to any component when working under the following atmospheric conditions:

a) *Temperature* — Any temperature between –10°C and 50°C;
b) *Humidity* — 20 to 100 percent RH without reference to temperature; and
c) *Wind Velocity* — Up to 50 km/h.

8.2 Altitude

The trowel shall be capable of giving its full output up to 1 500 m altitude.

8.3 Performance Test

8.3.1 *Routine Test*

Machine to run for 2 h intermittently on hard floor with 15 min run and 15 min rest.

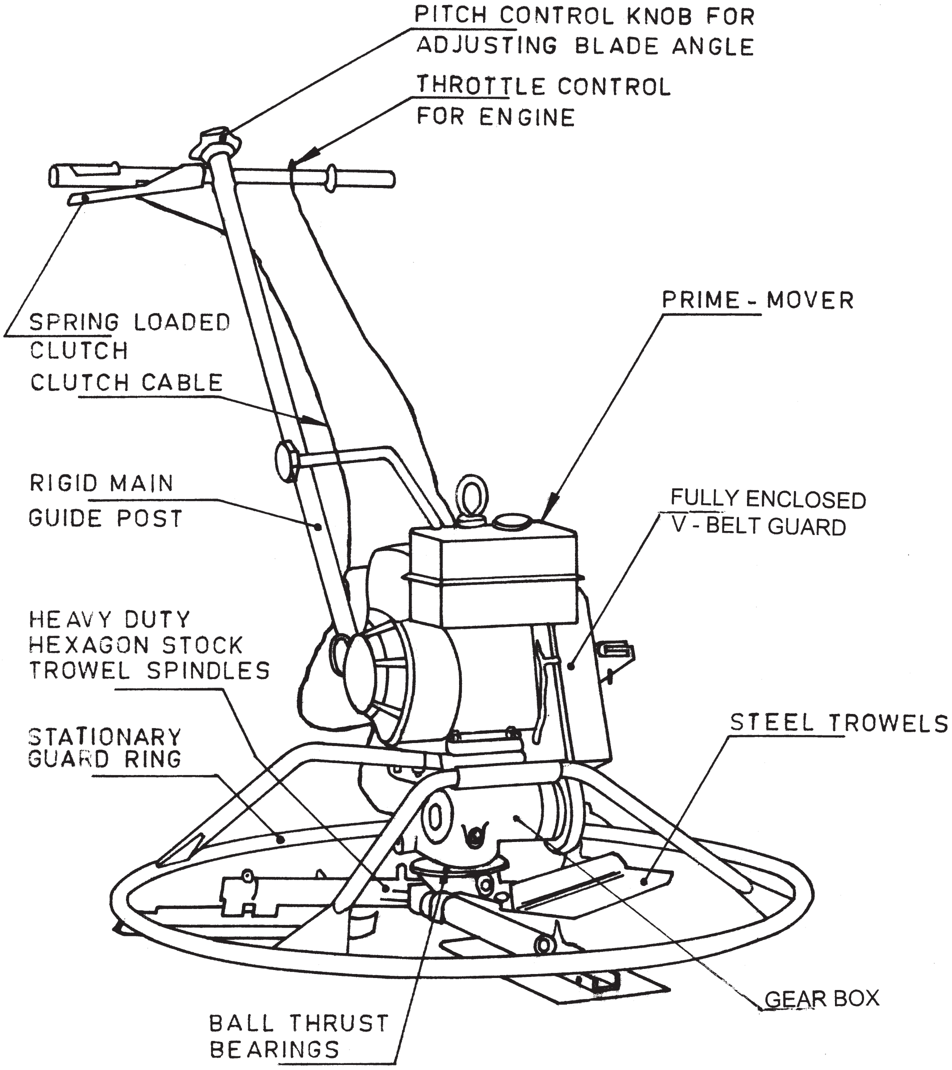
PITCH CONTROL KNOB FOR ADJUSTING BLADE ANGLE
THROTTLE CONTROL FOR ENGINE
SPRING LOADED CLUTCH
CLUTCH CABLE
PRIME - MOVER
RIGID MAIN GUIDE POST
FULLY ENCLOSED V - BELT GUARD
HEAVY DUTY HEXAGON STOCK TROWEL SPINDLES
STATIONARY GUARD RING
STEEL TROWELS
GEAR BOX
BALL THRUST BEARINGS

FIG.1 A TYPICAL SKETCH OF POWER TROWELL

8.3.2 *Type Test*

Machine to run for 20 h intermittently on hard floor with 15 min run and 15 min rest.

9 CONTROLS

The following controls shall be provided, which shall be easily accessible to the operator:

a) A pitch control knob shall be provided at a convenient place of the steering handle in order to vary the pitch of blades in relation to the surface, according to the requirements of the trowelling. The pitch shall be adjustable at any position between 0° and 15°.

b) Mechanism for adjusting prime mover speed, as required.

c) The petrol engine driven machine shall be provided with a sensitive (Deadman type) clutch for controlling the trowel. A hand lever shall be provided on the steering handle to operate the clutch so that if at any time, the operator is unable to attend to or manage the trowel or for any reason whatsoever, his hand grip becomes loose, the trowel stops instantaneously keeping the prime mover running.

d) In the case of electric driven machine, 'ON' and 'OFF' push buttons shall be provided on the steering handle to start or stop the motor and trowels.

10 LUBRICATION

Adequate lubrication of all moving parts shall be provided keeping the maintenance schedule as simple as possible.

11 SAFETY REQUIREMENTS

11.1 Safety guards for moving parts shall be provided.

11.2 A strong tubular frame shall be provided above and around the blades. Belt guard shall be provided for the V-belt driving the gear box from the prime mover.

11.3 Lever for instantaneous stopping of the operation of the blades shall be provided conveniently on the steering handle in the case of petrol engine trowel. In the case of electric motor driven trowel, a push button shall be provided with 'ON' and 'OFF' at a convenient place on a steering handle, to stop the operation of blades.

12 FINISHING

All parts and components shall be provided with two coats of anti-corrosive primer and one coat of synthetic enamel paint or PVC paint (each of 30µ thickness) before assembly of the power trowel. The components shall be thoroughly cleaned for removal of rust, oil, grease, dust, etc, before application of primer coats. Second coat of synthetic enamel paint or PVC paint (30 µ thick) shall be applied on the machine after its final assembly. Synthetic enamel paints shall conform to IS 2932.

13 TOOLS AND INSTRUCTION MANUALS

13.1 Tool Box

A tool box shall be provided along with each machine. It shall contain the necessary tools for normal running adjustments and lubrication of the machine. Instruction manual, an inventory of tools and a spare parts book shall be supplied.

13.2 Maintenance Manual

A preventive maintenance manual with instructions for routine and preventive maintenance checks and servicing shall be furnished with each trowel.

14 MARKING

14.1 Rating Plate

Each trowel shall have a rating plate firmly attached to some part which will not be easily removable. The plate shall have clearly marked on it the following information:

a) Manufacturer's name and recognized trade-mark;
b) Year of manufacture;
c) Machine serial number;
d) Engine/electric motor make, serial number, power output and revolutions per min; and
e) Trowel size (sweep).

14.2 BIS Certification Marking

The power trowel may also be marked with the Standard Mark.

14.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Construction Plant and Machinery Sectional Committee, MED 18

Organization	*Representative(s)*
Ministry of Defence, CQAE, Pune	Brig K. K. Kaushal (***Chairman***)
Airport Authority of India, New Delhi	Shri G. K. Choudhary Shri R. L. Sharma (*Alternate*)
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Builder's Association of India, Mumbai	Shri T. H. Peshori
Caterpiller India Pvt Ltd, Chennai	Shri Prajeesh Sankaran
Central Building Research Institute, Roorkee	Shri S. K. Saini Shri D. K. Gautam (*Alternate*)
Central Public Works Department, New Delhi	Shri K. K. Sharma Shri Vimal Kumar (*Alternate*)
Central Road Research Institute, New Delhi	Dr P. K. Nanda
Central Water Commission, New Delhi	Shri R. K. Sinha Shri Atul Jain (*Alternate*)
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Directorate General of Supplies & Disposals, New Delhi	Shri K. C. Jha Shri S. K. Agarwal (*Alternate*)
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Engineer-in-Chief's Branch, New Delhi	Shri R. A. Dubey Shri Arul Das (*Alternate*)
Escorts Construction Equipment Ltd, Faridabad	Shri V. K. Jadon Shri S. K. Ghosh (*Alternate*)
Greaves Cotton Ltd, Mumbai	Shri R Ganesh Shri K Raj Kumar (*Alternate*)
Indian Road Construction Corporation Ltd, New Delhi	Shri M. N. Singh Shri A. Sen (*Alternate*)
Ingersoll-Rand, New Delhi	Shri P. S. Gyani Shri Harkesh Jaggi (*Alternate*)
Ircon International Ltd, New Delhi	Shri S. K. Gupta
L&T Case Equipment Pvt Ltd, Pithampur	Shri U. S. Kulkarni Shri Rajiv Shalia (*Alternate*)
L&T Komatsu Ltd, Bangalore	Shri G. S. Narayana Shri H. N. Nagarajaaraya (*Alternate*)
Ministry of Road Transport & Highways, New Delhi	Shri S. N. Das
Ministry of Defence, DGQA, New Delhi	Col S Suresh Col V. V. Kadam (*Alternate*)
National Council for Cement and Building Material, Faridabad	Shri Satish Sharma Shri A. K. Mishra (*Alternate*)
National Projects Construction, Corporation Ltd, New Delhi	Shri R. P. Chopra Shri S. M. Gupta (*Alternate*)

Organization	*Representative(s)*
Punjab Irrigation & Power Department, Chandigarh	Chief Engineer Director (*Alternate*)
Speedcrafts Ltd, Patna	Shri Shashank Agarwala Shri H. K. Sharma ((*Alternate*)
In personal capacity (*14, HIG Duplex, Chander Nagar*, *Ghaziabad*)	Shri S. N. Mahajan
In personal capacity (*Flat No. 64, Pocket D-10 Sector 7, Rohini, New Delhi*)	Shri Rajendra Jee
In personal capacity (*G-99, Pushkar Enclave, Paschim Vihar, New Delhi*)	Shri Hans Raj
BIS Directorate General	Shri C. K. Veda, Scientist 'F' and Head (MED) [Representing Director General (*Ex-officio*)]

Member Secretary

Shri M. K. Paramanik
Scientist 'B' (MED), BIS

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BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
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Regional Offices:		*Telephones*
Central :	Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	2323 7617 2323 3841
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